

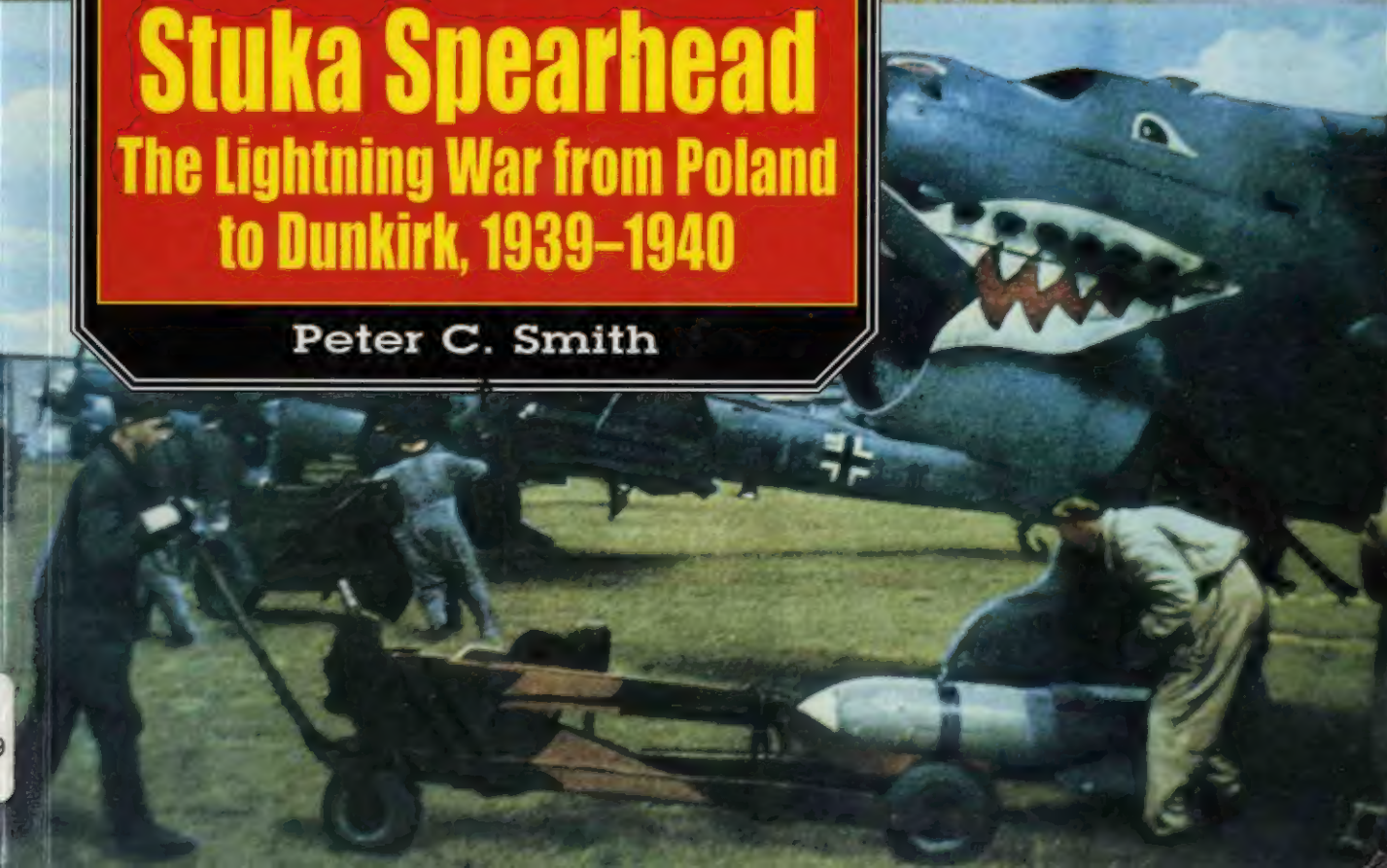
LUFTWAFFE AT WAR



Stuka Spearhead

The Lightning War from Poland
to Dunkirk, 1939-1940

Peter C. Smith



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A Ju 87B returns from a mission which was conducted without a rear gunner to save weight; the accompanying Me 109 presumably gave them all the protection they required. (Archiv E. J. Creek)



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LUFTWAFFE AT WAR STUKA SPEARHEAD THE LIGHTNING WAR FROM POLAND TO DUNKIRK 1939-1940

When the German decision was taken to attack Poland, it was with the firm knowledge that the *Luftwaffe* was even more ready for war in September 1939 than it had been a year earlier at the time of the Munich climb-down. The British and French bought a year's grace for themselves by sacrificing the Czechoslovakian nation, but the Germans made better use of that time preparing for the final show-down than the Allies. The decision to make 1 September 1939 the deadline for the attack, even at the risk that Britain and France would, this time, honour their obligations to the Poles, meant that *Generalfeldmarschall* Erhard Milch's long-term plans for the development of the *Luftwaffe* to its peak strength in 1942 had to be abandoned. Despite this fact, the kind of war that Adolf Hitler envisaged, limited but annihilating campaigns of short duration against each of his potential opponents in turn, was well within the grasp of the *Luftwaffe* as it then stood and, vis-à-vis the Allies, the Germans had several important advantages.

Firstly, they were ready; the Allies most certainly were not. The *Luftwaffe* had been placed on a full war footing early in 1939 and was primed for immediate action to an agreed plan. Secondly, the occupation of Czechoslovakia had given them additional facilities, airfields for training and aircraft factories like the Tatra works. Thirdly, they had the benefit of modern combat experience fed back from their *Legion Condor* contributions to the victory of General Franco's forces in Spain. In particular, many of the theories of army cooperation and close air support were put to the practical test and invaluable lessons absorbed. Finally, the opponents had their own re-armament programmes in full swing, which meant that, even though Germany might be more

ready in 1942 than in 1939, its opponents would have caught up, and the balance would not have been so favourable to the *Luftwaffe* at that later date.

Much criticised for failing to develop a long-range strategical bomber, the fact was that there was no outstanding requirement for such a weapon in order to achieve Germany's military ambitions in 1939 so, although such a project was under active development, the short-term requirements of interdiction and back-area bombing in support of the *Wehrmacht* and its *Panzer* columns were paramount.

It was here that the dive-bomber arm came in. The subject of many post-war myths that refuse to die, in fact dive-bombing had been invented, used in combat action and carefully analysed and tested by the British, all in the period 1917-19. The Americans, usually credited with its introduction, came late to the concept, picking it up from the RAF in France and later making very small and limited use of it with their Marine Corps units in Haiti and Nicaragua. It was not until the late 1920s that the US Navy began to really take notice of its potential, and much later that they developed the 'Helldiver' concept, so often held up as the origins of the German *Sturzkampf* force.

In fact long before the much-hyped purchase of two Curtiss F8C-4 biplane aircraft from America by *Generaloberst* Ernst Udet, the *Luftwaffe* had been conducting its own dive-bombing trials at the secret-testing ground at Lipetz in the Soviet Union, and observing similar experiments conducted by the Swedish air force at Frösön. As early as 1933 test pilot Willi Neuenhofen had conducted a series of twenty-six dive-bombing tests with the Junkers K-47 monoplane fitted with bomb-racks, experimental two-ring eye-sight for vertical bombing, a

direction gyro, air brakes, automatic recovery devices and other specialist equipment.

Indeed, the clandestine *Luftwaffe* had developed two generations of biplane dive-bombers, the Heinkel He 50, which went into commission with the first dive-bomber group, *Gruppe I./162* on 1 April 1936, and the Henschel Hs 123, which entered service in 1937 with the St.Gr. 1./162 'Immelmann'. This was at the same time that the Junkers company were developing their own monoplane dive-bomber, the Junkers Ju 87, through its early design and test models, into the working 'Anton' series that was battle-tested in Spain and on to the 'Bertha' type, the B-1 version of which formed the main complement of the *Stukagruppen* with which Germany went to war.

There was no great consensus at the *Technisches Amt* of the *Reichsluftfahrtministerium* (RLM) for the dive-bomber; in fact the higher echelons of the *Luftwaffe* were evenly divided into pro- and anti-dive-bomber camps. The basic requirements for *Luftwaffe* war operations were enumerated in the Air Field Manual of 1935. The number one priority was the securing and the maintaining of air superiority; everything else was subordinate to this. Once achieved, the second priority was spelt out as 'action in support of the ground forces'. From this the *Luftwaffe* never wavered and it was in marked contrast to the air forces of Britain, the United States, France and Italy, to whom any hint of cooperation with the army, other than by aerial spotter aircraft, smacked of subservience to another service.

One of the major opponents of dive-bombing was *Generalfeldmarschall* Wolfram von Richthofen, who underwent conversion during the Spanish experiences and became the leading exponent of the dive-bomber with VIII.*Fliegerkorps* during the Polish, French, Balkan and Russian campaigns. Udet's greatest contribution to the existence of the *Sturzkampf* was his immediate reversal of Richthofen's cancellation of dive-bomber development when he succeeded him as head of the Development Branch in June 1936.

The basic theory of dive-bombing was of the utmost simplicity. Given that various factors of the speed of the aircraft in horizontal flight, wind strength, sighting difficulties at high altitudes, drift of the bomb in descent and so on, all added to the difficulties of achieving accu-

racy in the delivery of bombs, it was only common sense that any method of attack which eliminated most of these would naturally result in a higher rate of success. By aiming the whole aircraft at the target, holding it there while the eye-sight was lined up, descending to a low level before bomb release, and thus ensuring the trajectory of the descending missile followed much more closely the trajectory of the aiming carrier until within the last few minutes of its flight time, enormous accuracy was achieved by dive-bombing. In fact pre-war tests showed that a factor of more than ten to one was commonly achieved.

This being a perfectly reasonable factor, the adoption of dive-bombing was a logical step for any nation to adopt. What turned the British, Americans and Italians against the concept was a combination of several factors, differing in origin, but combining to make an almost pathological aversion to the use of the dive-bomber. Let us examine each in turn.

Firstly was the ingrained wishful thinking that the heavy bomber laying waste to opposing nations' cities and populations would quickly win any war, alone and unaided, and make protracted land warfare and naval blockades, with their respective carnage and mass starvation, a thing of the past. The air weapon was relatively new and was embraced by the popular media of the day automatically as against old methods, which had led to such terrible casualty lists in World War I. If there was a short-cut then it was welcomed by the politicians, especially in the western democracies, ever shy of providing adequate defence if it meant loss of votes. The newly formed air forces, shrilly proclaiming their independence and fighting for survival in a period of shrinking budgets, insisted that the heavy bomber was the answer. People like Douhet in Italy, Trenchard in Britain and Mitchell in the United States had their dubious but loudly proclaimed theories endorsed by, for example, the British premier Baldwin, declaring that 'the bomber would always get through' as an excuse for not providing sufficient fighter defences. Independence was everything to these airmen and so the total commitment to aiding the army in land battles, the cardinal feature of the *Luftwaffe*, was utterly alien to them.

Secondly, and allied to the above thinking, the British and Americans had convinced

themselves of two incorrect assumptions. One was that the new altitude bomb sights, like the Norden in America, would produce accurate hits from a great height. The USAAF declared that the new B-17s using this device would drop 'a bomb in a pickle barrel'. The war that came soon showed that such heady assumptions were so much hogwash. The RAF bombing campaign of 1939-42, which the BBC daily declared was destroying German cities and their capacity to wage war, was a total failure, with some bombs being dropped as much as five miles from the target. So much for high accuracy. At sea results were even worse, with moving warships proving almost impossible to hit, let alone sink, by high-altitude bombing, despite incredible claims to the contrary. The German fleet sailed through the English Channel in 1942 and was to have been attacked by over 250 RAF bombers, half of which failed to even locate the ships in that narrow stretch of water, while the other half attacked both British and German ships indiscriminately without causing any damage. In the Mediterranean the same thing happened with the Italian high-level bombing and British fleets and convoys paraded up and down the length of that sea almost as they pleased, until the arrival of the German *Stukas* on the scene. At the Battle of Midway the B-17s were credited in the New York press with having destroyed the Japanese fleet, but failed to score a single hit, although they almost sank an American submarine which they claimed was a Japanese heavy cruiser.

The other factor that turned the west against dive-bombing was the claim that modern 'high-speed' monoplane aircraft were unable to dive-bomb at an angle of much more than 30 degrees. RAF experts said it was impossible, and relied on low-level attacks by Battles and Blenheims, which proved totally useless. This was a nonsense and by the end of the war such high-performance aircraft as Spitfires, Thunderbolts, Mustangs and Typhoons were all employed as dive-bombers. Finally, and here some elements of the *Luftwaffe* agreed, anti-aircraft fire had reached such perfection that to dive below a certain level was tantamount to suicide and could not be contemplated. Again, the theory was sound, but in practice it required very steady nerves to stand at a gun while a line of dive-bombers was descending

directly towards you. In practice, losses were small and the hits achieved by the dive-bomber were many.

If a two-crewed dive-bomber, cheap to produce and economical to run, adaptable and able to keep up with a moving front line, could hit the target ten times as often as a larger six- or seven-crewed heavy bomber from its fixed airfields and with enormous costs, it made a more viable weapon of war. So dive-bombing, rejected in the west, made for a cost-effective proposition to the new *Luftwaffe*.

Thus it was that, on the outbreak of war, the Junkers Ju 87 B-1 (commonly known outside Germany as the *Stuka*, an abbreviation of *Sturzkampfflugzeug* which in the *Luftwaffe* meant all aircraft of the dive-bomber type), equipped all eleven active German dive-bomber units, the III./St.G. 51 with *Luftflotte* 3, the I./St.G. 1, the I., II. and III./St.G. 2, the *Stab*, I., II. and III./St.G. 77, IV.(St)/LG. 1 and the 4.(St)/Tr.Gr. 186 all with *Luftflotte* 1.

There was a theoretical establishment strength of 319 dive-bombers, given the job of destroying vital objectives well behind the front lines, such as aircraft and tank factories, ammunition dumps, airfields and aircraft on the ground, military headquarters, key rail and marshalling yards to hamper the movement of enemy troop formations, bridges and viaducts, and so on. In fact these were much the same objectives given to all other bomber arms, but the *Stukas* had the vital asset of accuracy, being five or six times more likely to hit what they aimed at than any level bomber.

Added to these 'back-area' requirements, were the 'targets of opportunity' and true close-support roles, in which the dive-bombers would attack any enemy strongpoint or fortress, or concentrations of artillery, tanks or infantry that sought to make a stand against the *Wehrmacht*. It was known that the morale of unseasoned troops cracked when confronted by dive-bombing, which is a very personal form of aerial attack, and this was later to be played upon with the introduction of wind-siren devices on both the *Stuka* and its bombs, which added to the natural howling scream of an aircraft in a steep dive.

It was not known just how effective the *Stukas* would be, and their outstanding successes in all these roles came as almost as big a surprise to its *Luftwaffe* advocates as it did

to the stunned recipients of its visitations. Critics always state that the *Stuka* depended totally for its initial, and its continued, success, on the establishment of air superiority. This is perfectly true, but what they do not add, ever, is that this is a requirement for all bomber aircraft, not just dive-bombers. It was proved very quickly that Allied long-range types like the Vickers Wellington could no more operate without this requirement, than could the *Stuka*. The RAF soon switched to night bombing as it could not face daylight fighter interception any better than could the Junkers Ju 87. The huge Allied four-engined bombers of the later war period, like the Avro Lancaster and Boeing B-17 Fortress, designed to win the war unaided, proved just as vulnerable without air superiority as the *Stuka* was, and their losses were appallingly higher.

What the *Stuka* achieved, when it had air superiority, was the transformation of air and land warfare, with countries falling in days and weeks rather than after campaigns that lasted for years. Moreover, it was the combination of *Stuka* and *Panzer* that won these battles, the combined effect of both working in harmony far outweighing the impact of the individual components, and they proved a winning, and (in terms of lives) economical team. The conquest of Poland cost a mere thirty-one *Stukas*, most of these to AA fire. The *Stuka's* inherent accuracy, already also tested in Spain, proved to be a potent weapon against warships also, and this task too was added to its growing agenda as the war developed.

The Norwegian campaign was a small-scale affair compared to Poland, but it again emphasised the versatility of the *Stuka*, now equipped with long-range fuel tanks. A small number of dive-bombers operating against fortresses, slow-moving Allied troop columns and, especially, against the Allied naval forces off the coast, proved decisive.

The invasion of the Low Countries and France in May 1940 brought to a triumphant

conclusion all the lessons learnt in the earlier campaigns and it proved the absolute superiority of the mobile form of warfare perfected by the Germans and given the name of *Blitzkrieg* by the American press, over the static form as practised by the Allies, who, even with nine months' warning, proved unable to cope with it. It was Poland on an even larger scale and the defeat of the Netherlands, Belgium and France was achieved within a six-week period for the loss of only 120 *Stukas* from all causes, which included thirteen shot down by naval gunfire over Dunkirk.

With the fall of France a different type of situation developed and the English Channel could not be taken at the charge like the river Meuse or the Aisne. However hard the *Stukas* might hit RAF airfields and installations in Kent and Hampshire, the immediate follow-up and over-running of the impacted targets could not be made by the *Panzers*; one half of the winning team was lacking. Airfields devastated by dive-bombing were therefore given ample time to recover, fighter squadrons could be rested out of *Stuka* range and rotated. On the occasions when their own fighter cover failed to give them adequate protection the Ju 87s naturally suffered severe losses. In the Battle of Britain a total of fifty-nine *Stukas* were lost (but not the 'hundreds' claimed by Winston Churchill and the British press) during the months of July and August. Yet morale remained high and there is no doubt that, had the *Wehrmacht* finally got ashore in Britain, the smooth-running team of *Panzer* and *Stuka* would have been just as effective against the remnants of the ill-equipped British army, however gallant, as they had been earlier against the fully prepared regulars.

It was not to be, but the *Stuka* story was far from over; indeed it had hardly begun. The aircraft that made the very first bombing attack of World War II was to go on fighting in the front line, by day and by night, until the very last day of that conflict.



A Junkers Ju 87B-1 of Stukageschwader 77 over flat countryside in north-west Europe. The dive-bomber was the subject of much debate pre-war in the *Luftwaffe*, with both advocates and critics, but it had proved itself in the Spanish Civil War as a precision instrument of considerable merit for back-area bombing of specific targets like bridges, road junctions, railways and ships. During the Polish campaign its accuracy and its psychological effect on opposing troops and transports in the field of battle came as a revelation even to the Germans themselves. The subsequent campaigns in the Low Countries, France, the Balkans, North Africa and against the Soviet Union only enhanced these early findings. (Archiv Von Lutz)

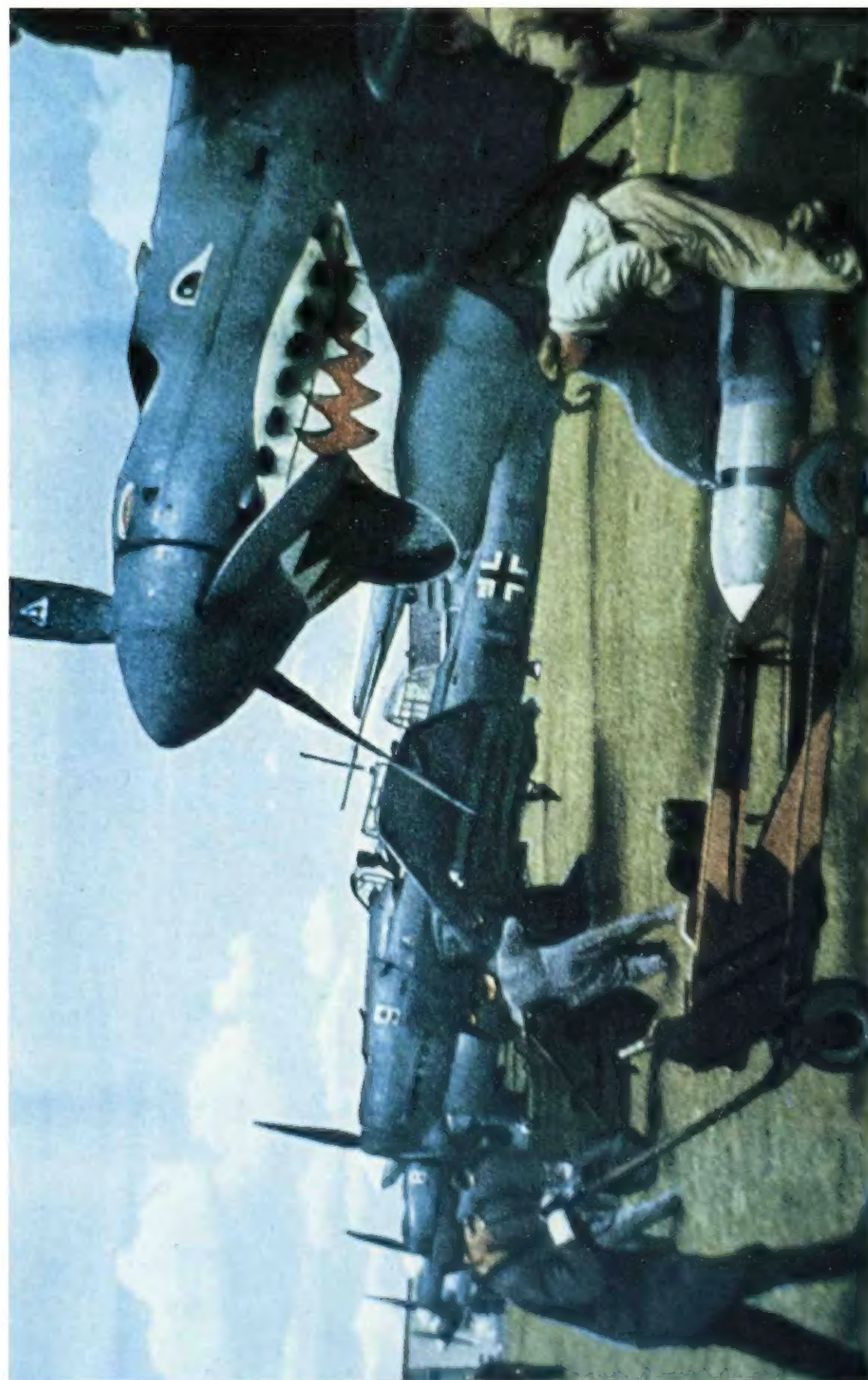


Above: A *Kette* of Junkers Ju 87B-1s fully bombed-up head out for a sortie in 1939. The spinner caps are white and the aircraft's unit numeral is carried on the nose and repeated on both wheel spats. The upper surfaces are painted in a two-tone green ('black' green and 'dark' green), with light blue under-surfaces. The three-plane *Kette* formation was the normal base formation, with three aircraft, the leader positioned slightly ahead of the two wingmen, the *Kettenhunde* ('Chained Dog') formation. The numbers could vary slightly, but the basic pattern was: three *Ketten* formed a nine-plane *Staffel*, with each *Kette* adopting a similar layout; three *Staffeln* plus reserve planes formed a thirty-plane *Gruppe*; and three *Gruppen* plus a three- or four-plane *Stab* (staff) unit formed a *Geschwader*. (Archiv Von Lutz)

Right: A busy scene at a forward air strip during the Polish campaign. A Junkers Ju 87B-1 is being serviced in the field between missions by the 'Blackmen' ground crews and armourers (nicknamed after their distinctive black working overalls). The small 110 lb (50 kg) bombs in the foreground are ready to be loaded onto the *Stuka*'s underwing racks, seen outboard of the *Balkenkreuz*, while the larger 551 lb (250 kg) weapons, whose fins can just be seen in the centre, are waiting to be loaded onto the 'swing-crutch' located under the fuselage. Such a bomb-load might be considered small by later standards, but the *Stuka* had the unique ability among aircraft of that era to ensure that these weapons landed on, or very close to, the target. (Archiv Von Lutz)

Opposite page, top: Visit by the 'Top Brass': Reichsmarschall Hermann Göring visits his beloved *Stuka* units held ready under camouflage netting during a tour of the front-line airfield of Norrent-Fontes, France, in August 1940. He is seen talking with Generalfeldmarschall Albert Kesselring, Commander of *Luftflotte 2*. The emblem carried by the Ju 87B-1, of a red devil riding a bomb and holding a flaming torch, is that of 9./St.G. 51, which became 6./St.G. 1 the month before. (Archiv Von Lutz)





A good action photograph showing the armourers bombing up the Ju 87Bs of the II./St.G. 77 at an airfield in France in 1940. The 551 lb main bomb is manoeuvred into place under *Hauptmann* Alfons 'Ali' Orthofer's shark-nosed *Stuka*, S2+AC. The bomb trolley is fitted with a hydraulic cradle to raise the weapon into position. The dark band around the bomb has locating lugs on either side which meshed into the aircraft's swing-crutch. This was a device which swung the bomb down from below the fuselage during the near-vertical dive to clear the *Stuka*'s large propeller arc. The distinctive marking, which so suited perfectly both the appearance and the efficiency of the *Stuka*, was widely copied by Allied aircraft later in the war, by RAF Curtiss P-40 Kittyhawks in North Africa and by the same chimed fighter aircraft flown by the American Volunteer unit, the 'Flying Tigers', in China, but it originated with the *Kommodore* of II./St.G. 77's *Stuka*. (Archiv Von Lutz)



Above: Pilots are the same in all air forces and young *Stuka* pilots of St.G. 77's Auxiliary *Staffel* gathered respectfully around *Staffelkapitän* Helmut Leicht on an airfield in northern France are listening intently, and no doubt hoping to learn something from their more experienced colleague on how to swoop down on their targets across the Channel. Leicht had taken part in the Polish campaign and was one of the *Stuka* pilots who gave invaluable close support at the capture of the 'impregnable' Belgian fortress of Eben-Emael in May 1940. The pilots on the extreme left and right are wearing the standard flying gear of tan canvas flight suit, with zipped fasteners, the diagonal front one of which can be seen on the *Feldwebel* to the right of Leicht. The helmets are also of tan canvas with brown bakelite earphone housings. None is wearing a lifejacket, indicating that this is a

training and not an operational flight. The *Feldwebel* and three others are wearing their side-caps which have the *Luftwaffe* Eagle above the traditional black/white/red cockade. (Archiv Von Lutz)

Below: The long-range version of the Junkers Ju 87B-1 was the Ju 87R ('Richard'). The bolt-on 300-litre fuel tanks gave the *Stuka* the extra range necessary to ensure that no coastal waters were safe from its influence, as the Royal Navy found out to its cost off Norway and in the Mediterranean. This aircraft is from 4./St.G. 2 and features the light green shamrock on a white background emblem of that unit and is seen at Bonn/Hangelar airfield prior to transferring to the Mediterranean Theatre. (Archiv Von Lutz)





Above: The Junkers Ju 87B-1 carrying the personalised name of 'Anton Der Zweite' ('Anton the Second') on the port engine cowling, ahead of the prancing bull emblem of 6./St.G. 77, is seen with engine running on test at its base in the late spring of 1941. The fairings housing the twin machine guns can be seen above the leading edges of each wing, while the individual letter 'A' is carried on the front of each wheel spat. (Harold Thiele)

Top right: The classic *Stuka* pose: a Ju 87B nosed over into the dive and heading down towards the target to deliver its ordnance with enviable accuracy. The white dive brakes can clearly be seen fully extended, the two wing-mounted 110 lb SC50 bombs can be seen on each rack outboard of the *Balkenkreuz*, and the 'A' and 'Y' coding letters are carried either side of it, black on a light blue under-surface. The

numeral '2' on the wheel spat does not match the individual code letter 'A' in this instance. (Archiv Von Lutz)

Right: A gaggle of Junkers Ju 87B-1s moves purposefully at low level over the flat landscape of northern France with a full bomb load. The early morning sunlight glints on the cockpits and yellow spinners and throws the bulk of the aircraft into shade. The ability of the *Stukas* to respond quickly whenever summoned by the ground forces, and thus deliver their precision attacks against any hint of Allied resistance, was one of the major factors in the success of the *Blitzkrieg*. Of rugged construction, tough and able to absorb battle damage and the wear-and-tear of battle on the move from makeshift bases, the Ju 87 was the ideal battlefield air weapon and fully justified its nickname of 'flying artillery'. (Harold Thiele)





Norway saw the combat debut of the long-range Ju 87R-1 ('Reichweite' or 'Range'). Here a red-spinnared *Stuka* of 1./St.G. 1 with empty bomb racks heads back up the fjords to Sola airfield near Stavanger after completing a mission. The tanks were held by special attachment and straps to the

normal underwing ETC 50 bomb racks and, to compensate for the drag, sirens were not fitted to the undercarriage. For heavier bomb loads for close-range missions the tanks were unbolted and the 'Richard' became, in effect, a 'Bertha' with minimum alterations. (Archiv Von Lutz)



Above: Top Brass at Barth, 1938. During an inspection and demonstration of dive-bombing laid on by the IV. *Sturzkampf-Lehrgeschwader*, the heads of Germany's three armed services are caught informally on camera. From left to right: *Grossadmiral* Erich Raeder, stern head of the

German Navy; the soon to be dismissed Chief of the General Staff, General Franz Halder; and, enjoying his own jokes as usual, *Oberbefehlshaber der Luftwaffe*, Hermann Göring. (Schwartzkopff Archiv)

Right: A Junkers Ju 87B-1 of a *Stukaschule* above thick clouds. Clear visibility was a requirement of dive-bombing, as diving from heights of up to 15,000 feet at an 80 degree angle caused the altimeter to wind round at high speed. The pilot's concentration was naturally on the target, held in the centre of his reflector sight. Although the custom-built dive brakes and its fixed undercarriage combined to give the *Stuka* unrivalled stability in the dive and, although fitted with an altimeter-triggered warning horn which was pre-set, this ceased at the also pre-ordained bomb-release height. The pressing of the bomb release automatically triggered a strong spring which wrenched the elevator trim tab back to neutral and the *Stuka* would then resume a nose-up attitude. (Harold Thiele)





Opposite page, top: A last chance to relax before the storm: a summer meal for the officers of the II./St.G. 77 and their families at Neudorf at the end of August 1939. From left to right: *Hauptmann* Enneccerus; *Geschwaderkommodore* St.G. 77, *Oberstleutnant* Schwartzkopff and Frau Enneccerus. (Schwartzkopff Archiv)

Opposite page, bottom: Brunswick dummies: seen here at Braunschweig are mock-ups of a Ju 87 and an He 111. The buildings in the background are also dummies. It is interesting to note that the designers have even gone to the trouble of giving identification numbers to the plywood fakes, the *ersatz Stuka* carrying the coding D6+AA. Crude in this

ground close-up, from an Allied reconnaissance aircraft over northern Germany they would have probably passed muster. It was thought that this type of misinformation was carried out during the Polish campaign to dissuade the British and the French from attacking the Germans in the rear. They need not have worried. (Bernd Krag via James V. Crow)

Above: Gunter Schwartzkopff (left), known as the 'Father of the Stukas' from his long and painstaking development work with the dive-bomber arm, seen here with one of his officers, inspecting *Stukas* readied for action in their camouflaged revetments on the German/Polish border immediately before the first attacks, September 1939. (Schwartzkopff Archiv)



Opposite page, top: August 1939, and the eve of World War II: I. Staffel St.G. 77 waits for the call to attack at its forward base at Neudorf-bei-Opole (now known as Opole) on the river Oder, south-east of Breslau (Wrocław). Last-minute preparations are under way and final checks are being made. In the foreground can be seen a crate containing a 500 kg bomb, and beyond that a mobile starter motor. The *Stuka* was designed to work in the field and this careful planning extended to the mobility of each part of the supporting services. (Frau Schuh)

Opposite page, bottom: Seen at Radom airfield in September 1939, a range of *Stuka* bombs with suitable inscriptions is laid out for inspection. 'Betty' is a 50 kg weapon, 'Ursel' a

250 kg bomb and 'Gerda', at 500 kg, is the normal main payload carried by the *Stuka* at the start of the war. (Schwartzkopff Archiv)

Above: Time for humour at this forward *Stuka* base. The pilot of the Junkers Ju 87B-1 looks on resignedly as his ground crew pose on his machine in a variety of styles. The unit emblem is obscure on this print but the aircraft has unique spinner bands. Only a single wing bomb is carried instead of two, the inner rack remains empty, but the main bomb is in place and the starboard siren mounting is faired off. The early distinctive cowlings with their external hinges are clearly visible here. Note the large landing lamp on the leading edge of the port wing. (Luftfahrtarchiv Griebel)



Opposite page, top: First target! The very first bombing attack of World War II was carried out by a *Kette* of *Stukas* from the 3./St.G. 1, led by *Hauptmann* Bruno Dilley, along with *Leutnant* Horst Schiller and *Unteroffizier* Gerhard Grenzel. These three Junkers Ju 87Bs took off from the advance airfield at Elbing on the morning of 1 September 1939, and made their attack at 04.35, a quarter of an hour before the main German attack. Their objective was, contrary to what has frequently been claimed, not the actual Dirshau (Tczew) road and rail bridges across the Vistula river, but the controls and wiring of the demolition charges the Poles had already laid on the southern slope of the embankment to blow the bridge and deny it to the Germans in the event of war. To hit such a target the *Stukas* had been rehearsing for several days against a dummy target built near their base field of Insterburg. Each *Stuka* was armed with a single 250 kg bomb and four 50 kg underwing bombs and attacked at very low level through patchy ground mist. The attacks were accurate and the leads cut, but the German armoured train which should have followed up and taken the bridges was delayed too long. The Poles repaired the leads and blew the bridges later. (*Sellhorn Archiv*)

Above: With a heavy bomb ready on the swing-crutch and the rear gunner ready for action, Ju 87B-1s of the *Stab*/St.G. 2 head over Polish lakes towards another target early in September 1939. Beneath the outlined Swastika on the tailplane of the nearer unit is the serial 240, while the more distant aircraft carries its serial, 243, above the Swastika. The outlined letter 'Y' after the *Balkenkreuz* indicates the twenty-fifth aircraft of that unit. (*Bundesarchiv*)

Left: With a full bomb load, including a pair of SC50 bombs on side-mounts under each outer wing, this Ju 87B-1 of *Stab* II./St.G. 2 is seen heading into Poland without any gunner visible in the rear cockpit. The first German bomber to shoot down an enemy fighter was a *Stuka*. (*Bundesarchiv*)



Opposite page, top: Burnt-out railway locomotives at Radom station where a precision *Stuka* attack wrecked the strategically vital lines, equipment and rolling stock, catching an entire Polish Army division in the middle of embarkation for the front and destroying it as an effective fighting unit before it had fired a single shot in action. The value of dive-bombing was thus shown to be as pertinent and effective in influencing strategic objectives as to dominating tactical ones, and helped shape future *Blitzkrieg* tactics. This is yet another of the *Stuka* attributes usually *totally* ignored in post-war evaluations. (Schwartzkopff Archiv)

Opposite page, bottom: Planning on the move: the *Kommodore* of St.G. 77, *Oberstleutnant* Schwartzkopff, and *Generalmajor* von Richtofen, commander of the soon to be legendary VIII. *Fliegerkorps*, discuss tactics using a 551 lb

Stuka bomb as a makeshift conference table and seat at Wiklow airfield in Poland, September 1939, while the unit's 'Blackmen' look on. Informality, flexibility in the field, complete harmony with the land forces, with mutual objectives and the power to make fast decisions and respond to fast-changing scenarios were the hallmark of the *Luftwaffe's Stuka* units. This made for successful operations in stark contrast to the dazed fumbling of the British and French air/ground liaison at this period. (Schwartzkopff Archiv)

Below: Return from another mission. *Stukas* on an airfield during the Polish campaign. The empty swing-crutch under the fuselage which held the main bomb and swung it out to clear the propeller arc in the near-vertical dive can clearly be seen, as can the wing gun and the slatted dive brakes under the wing. (Bundesarchiv)

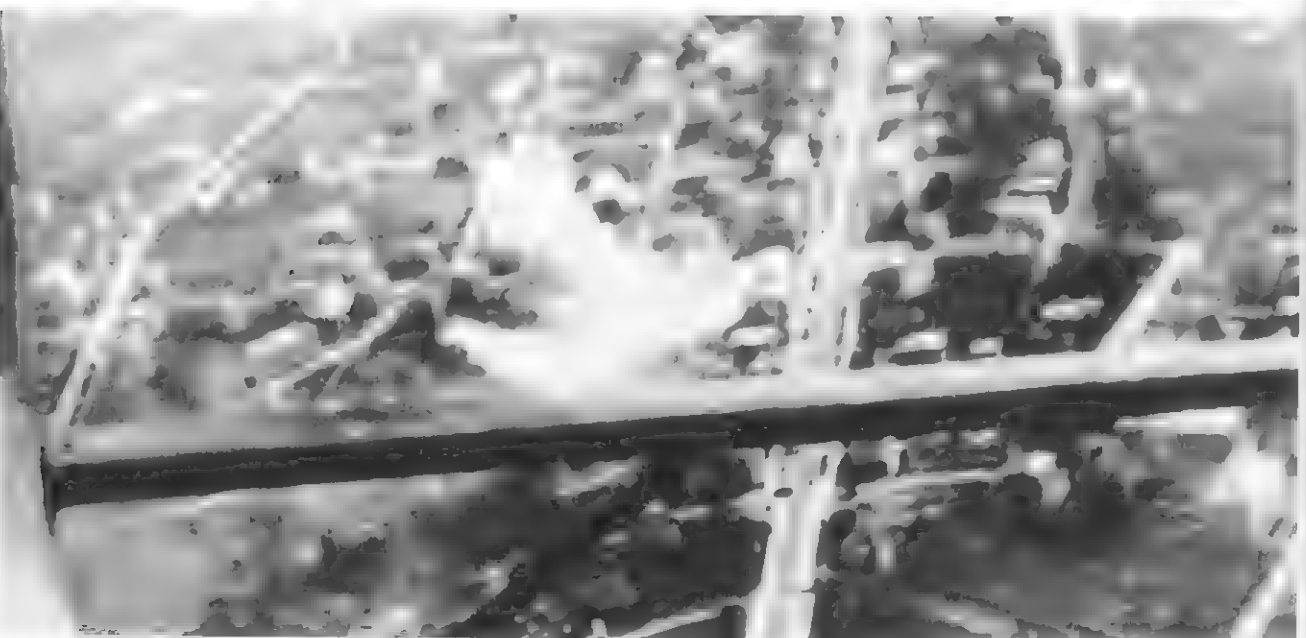


Right: A *Kette* of Junkers Ju 87B-1s of 2./St.G. 1. The centre aircraft with the code letters A5+AK carries the personalised name 'Peter' on its wheel spat, indicating that this is the mount of *Hauptmann* Peter Grassmann, the unit *Staffelkapitän*. (Franz Selinger)

Below: Radio operators of the 1. *Staffel* St.G. 77 relaxing between missions in Poland, 1939. This photo was taken at Wiklow early in the campaign and among those identifiable are (left to right) *Bombenpersonal* Hartmann, squatting in the foreground, with, in the background, *Bordfunktens* Mobius and Maurer (shirtsleeves and braces), *Bombenpersonal* Pohl (leaning forward), and his *Bordfunker* Bastian (holding the chicken), two unknowns, *Flugzeuggerätverwalter* Ronecker (with a mug), *Bordfunker* Hettinger (playing the accordion), another four unknowns and *Staffeloffizier* Leutnant Scheffel (seated). (Gramlich)

Opposite page, bottom: A look at the enemy's equivalent. This captured Polish Air Force PZL-23 Kara light bomber is examined with professional interest by two *Stuka* pilots on a captured airfield. Although in some ways having a resemblance to the *Stuka*, being of the same vintage, a monoplane bomber with a fixed undercarriage, the Polish machine was not a dive-bomber but a conventional light attack bomber, as favoured by the British with the Fairey Battle, the French with the Breguet Bre 691 and the Italians with the Breda Br 65 and, like all of them, was a failure in the army support role. (Sellhorn Archiv)





Opposite page, top: Aircrew from the 7. Staffel, III./St.G. 151, are pictured here in October 1939 examining their mission itineraries in front of the *Staffelkapitän's* Ju 87B-1, coded 6G+AR. They are wearing the *Luftwaffe* berets and flying overalls, which are well-equipped with numerous zipper pockets and the horizontal flap opening that gives a cape-like appearance over the right shoulder. The unit emblem, a black bull on a yellow star field with a fiery yellow comet tail, can clearly be seen. The aperture in front of the pilot's cockpit is for discharging a flare pistol. The open cover door in the middle of the non-slip wing-root walk-way is the fuel filler point for the inboard wing tank. (Alain Fleuret via James V. Crow)

Opposite page, bottom: Towards the end of the Polish campaign the surrounded Polish army tried to turn Warsaw itself into a fortress to be defended to the last. Selected targeting was made by the *Stukas* to hit areas known to be held by defending troops. On one such mission I. Staffel St.G. 77, led by *Staffelkapitän* Oberleutnant Helmut Bruck carried out a precision bombing attack on an area of Praga, an

eastern suburb of Warsaw. Taking off at 11.10 that morning, they carried out the attack without loss and made direct hits, as shown here. By 12.50 all the *Stukas* had safely landed back at their base. (Frau Schuh)

Below: A Ju 87B undergoing engine maintenance in the field. The radiator housing has been removed and lies beneath the wing. Both the mountings for the 'Trumpets of Jericho' sirens have been faired off on either undercarriage leg and the dive brakes have also been removed. Ease of maintenance in the field was yet another feature built into the *Stuka* with some forethought and, like the sturdiness of its undercarriage and general construction, made it a relatively simple aircraft to keep in the field during fast-moving campaigns over primitive terrain and almost non-existent base facilities. This meant that the *Stuka*, as proved in Russia, Tunisia and the Balkans, could often operate in conditions that grounded more sophisticated and 'advanced' aircraft, whose loudly trumpeted superiority over the 'anachronistic' *Stuka* was therefore rendered null and void. (Archiv Von Lutz)





Above: Polish anti-aircraft fire proved a far more potent threat to the *Stukas* than any fighter defences, and it was here that the toughness of the little Ju 87 first proved itself: aircraft returned to their bases with incredible injuries but survived. This 'Bertha', coded A5+JV, of the St.G. 1, took a large-calibre shell right through its *Balkenkreuz* on this mission – good aiming on the part of some unsung Polish gunner. Despite this it managed to land safely at its base of Grieslingen, East Prussia. (Kurt Luckhardt via James V. Crow).

Below: Germany was conscious of the need to conserve its

limited resources, and the astounding 'cost-effectiveness' of dive-bombing as opposed to level bombing made the *Stuka* an attractive proposition, especially as only tactical land campaigns against its immediate neighbours were ever envisaged. To beat the British naval blockade, which had brought it to near starvation in World War I, Germany determined on utilising every resource, and that included the salvage of any of its aircraft that it could. Here a *Stuka* fuselage is seen outside a hangar on a Polish airfield awaiting transportation back to the Fatherland. Unfortunately the identification codes have been removed by the wartime censor. (Richard Chapman)



Above: The *Oberbefehlshaber der Luftwaffe*, *Reichsmarschall* Hermann Göring visits his victorious dive-bomber units on the battlefield. Here the leader of the *Luftwaffe* wears a self-satisfied look, as well he might, as he watches General Freiherr von Richthofen congratulating the *Geschwaderkommodore* of St.G. 77, *Oberstleutnant* Schwartzkopff, on a job well done at Radom airfield, Poland, on 13 September 1939. (Schwartzkopff Archiv)

Below: *Reichsmarschall* Hermann Göring inspects the aircrew of 1./St.G. 77 at Radom airfield, Poland, on 13 September 1939, at the conclusion of their first lightning campaign in which they re-wrote the world's battle manuals for those willing to learn – which did not include the British or the French. (Frau Orthofer via Sellhorn Archiv)





Opposite page, top: The *Wackeltopfschiessen* of St.G. 77 at Celle airport in January 1940. As its nickname implied, it was a discarded main fuselage from a Ju 87B set up on a bed of hydraulics and motors which simulated the motions of an aircraft in flight for training purposes (as such it was a *Luftwaffe* equivalent to the RAF's Link trainer). The snow-bound forests of Germany give a clue to the reason that such land-based training was being undertaken and why the proposed German offensive against the west had to be postponed until the spring thaws. Present in the photograph are several aircrew from 1. *Staffel*, from left to right: *Bordfunktoren* Maurer, Sellhorn and Maier, and pilots *Leutnant* Hitz and *Unteroffizier* Knauer. (Sellhorn Archiv)

Above: The new *Kommandeur* of I./St.G. 77, *Hauptmann* Helmut Bruck (centre), talking to an unknown aircrewman on his arrival in command of the unit in the winter of 1940/41. On the extreme right is Government Inspector Zerner. (Sellhorn Archiv)

Left: Ju 87B-1s of the St.G. 77 at Lublin, south-eastern Poland, close to the newly established German-Soviet border, in late 1939, prior to their return to their home bases in Germany. Each aircraft has been shackled by means of bomb crates and lines due to the high winds and each wears a protective and tailored tarpaulin cover over engine and cockpit to keep out the worst of the elements. Note the *Werks* number carried prominently in white on the rudder of the third *Stuka* but not on any of the others. (Karl Schnoerrer via James V. Crow)



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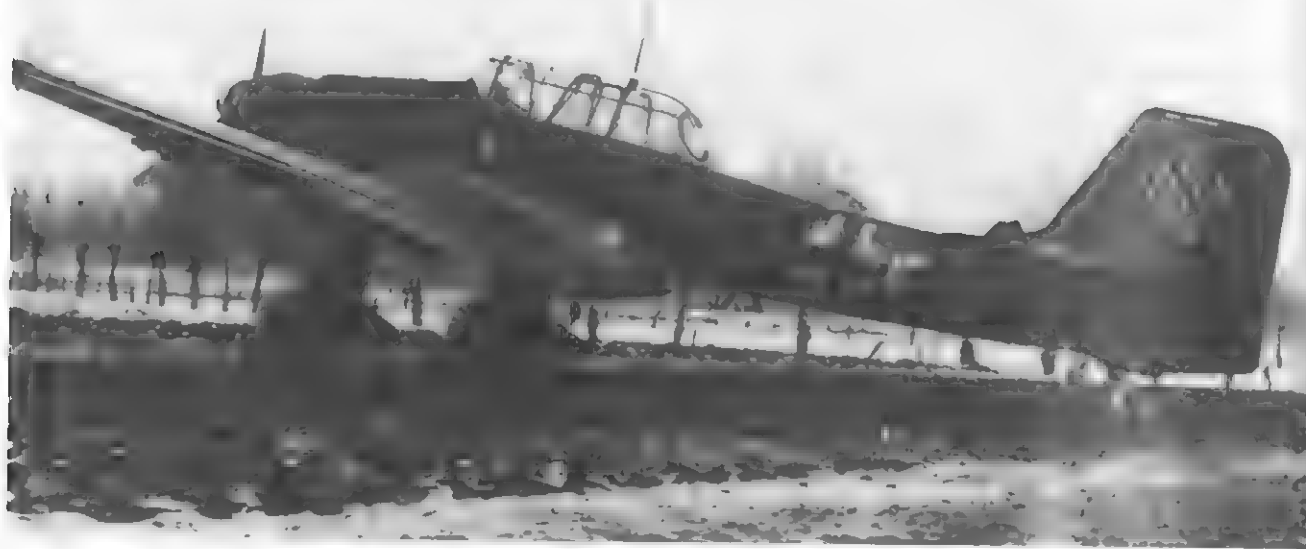
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Opposite page, top: Test flying the Ju 87R-1 commenced in the winter of 1939/40 and this innovation was soon to prove its worth. The 240-litre wing-root tank capacity of the standard B-1 was improved by the addition of an extra 150-litre fuel tank in both outer wing panels. In addition special underwing racks were fitted under each wing to carry a total of two 300-litre capacity (295 litres in actual practice) jettisonable fuel tanks. This increased the range of the R-1 to 1400 kilometres, at a cost of restricting the external combat weapon load to only a single 250 kg bomb. Here flight testing is being conducted as the pilot brings one of the first R-1s down on a snow-covered runway at Bremen-Lemwerder. (via Ken Merrick)

Left: The long winter of 1939/40 saw the *Stuka* units held on a leash due to the weather conditions. Although the Junkers dive-bombers and their crews would have to live and fight in much worse conditions in the Russian winters of 1941/42, 1942/43 and 1943/44, at this stage of the war the *Luftwaffe* held back until the spring thaw, busy assimilating and practising the many lessons they had learned during the brief but enlightening watershed of the Polish campaign. But they also trained hard for their next mission and conducted numerous painstaking rehearsals of precision dive attacks for the battles being planned while they waited. Here men of the 1. *Gruppe/Stukageschwader* 2, with their red 'Scottie' dog emblem, relax on the snow-bound German airfield of Rotenburg near Bremen. (Harold Thiele)

Above: A Ju 87B-1 'Bertha' seen on a German airfield in the winter of 1939. The Swastika on the tail extends over onto the rudder in the pre-1940 style, and the open oval exhaust stacks and smooth rear cowlings are those of the early production models. The relocated straight pitot boom is now carried on the starboard wing, at the end of which can be seen the starboard navigation light. (Leo Zahn via James V. Crow)



Opposite page, top: This Ju 87B-2 of I./St.G. 77 had to force-land in a field close by Lippstadt/Celle air base during a test flight in the harsh winter of 1939/40. It appears to have escaped from its ordeal with relatively minor damage, which reflects the skill of the pilot. It carries no rear gun or other armament as it was on trials at the time. (Wilhelm Landau via James V. Crow)

Above: This Ju 87 of I./St.G. 77 had to make an emergency landing in a snow-sprinkled field close to Lippstadt/Celle airfield during the bleak winter of 1939/40. Here the maintenance team are busy dismantling the *Stuka* so that it can be moved back to base and repaired. Already the wheel spats have been removed, a foretaste of a regular event under similar conditions in the Russian wastes two years later. The long-planned German offensive would have to wait until conditions improved. (Wilhelm Landau via James V. Crow)

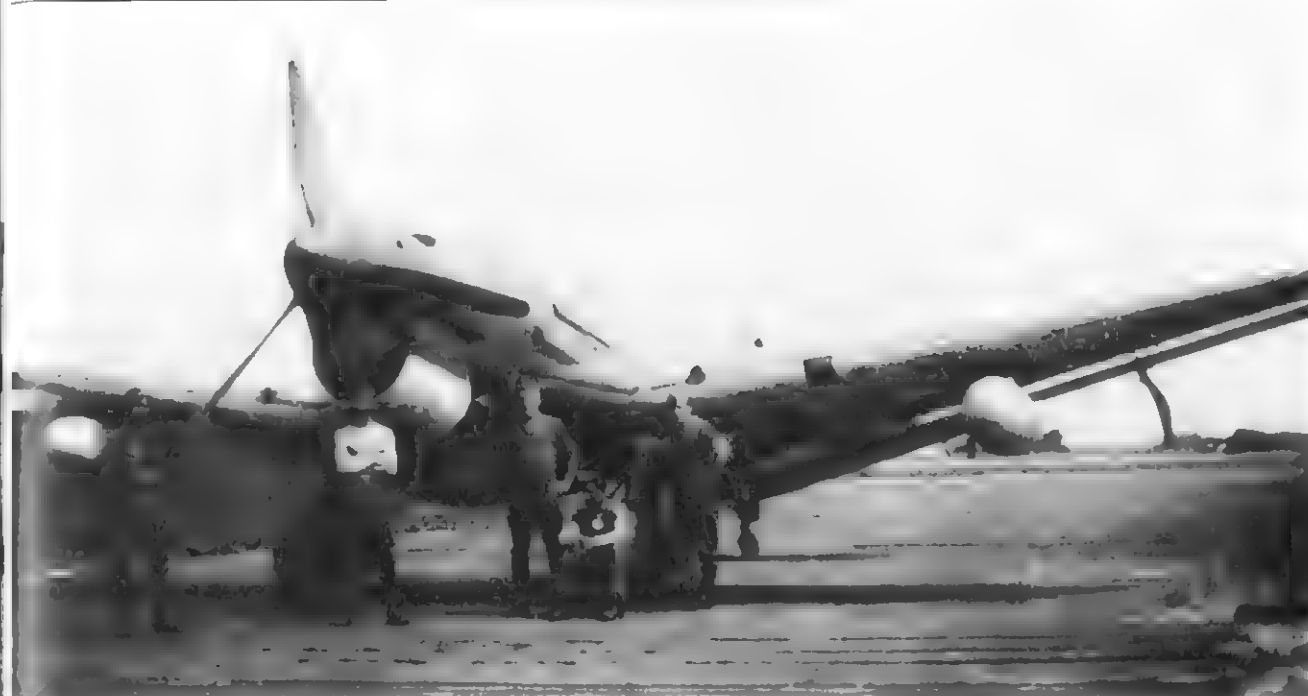
Left: Resting between sorties on the captured Norwegian airfield of Vaernes, near Trondheim, April 1940, the crews of the *Stab/1. Gruppe* of St.G. 1 snatch some sleep alongside *Hauptmann* Paul-Werner Hozzel's Ju 87-R1. Note the unit's metallic banner, with the 'Hans Huckebien' diving raven, also featured on the aircraft. The censor has scratched out the long-range fuel tanks carried by these R-1s as it was this highly-secret addition that gave the *Stuka* the extra range to harry the Allied navies off the coast of Norway and inflict unexpected losses on them. Among the *Stuka*'s warship victims were the destroyers *Afridi* and *Bison* (Polish) and the sloop *Bittern*, all sunk, while the heavy cruiser *Suffolk*, AA cruiser *Cairo* and many smaller ships all received damage. This resulted in the awarding of the first *Stuka* Knight's Crosses, to *Gruppenkommandeur* Hozzel himself, *Unteroffizier* Gerhard Grenz, *Leutnant* Martin Moebus and *Oberleutnant* Elmar Schaefer. (Franz Selinger)



Above: The long-range Ju 87R-1 came as an unpleasant surprise to the British and French navies working off the coast of Norway in the spring of 1940. The transfer of I./St.G. 1 soon made an impact and warships suddenly found themselves within the striking range of the dive-bombers, and, in the main, they were ill-equipped to deal with them. Each of the R-1's detachable fuel tanks was carried on (detachable) steady braces fitted to the bomb racks under each wing. Each tank was fitted with a securing strap, braced by four long steadying pegs, also detachable, which homed into matching sockets on the upper surface of the tank. Each tank carried 300 litres of fuel (66 Imperial gallons) and gave the R-1 a range of 870 miles. (Bundesarchiv)



Below: In Norway in 1940 the Royal Navy first learned the power of the dive-bomber. The anti-aircraft sloop *Bittern* burns steadily after taking a direct hit aft. Her sister ship, *Black Swan*, took a *Stuka* bomb aft that passed between her propeller shafts, but managed to limp home. These ships were specifically designed as anti-aircraft escorts for convoys and carried a strong armament of eight 4-inch HA guns, as well as smaller weapons, but they had no room to manoeuvre in the narrow fjords and could not cope with dive-bombing. (Imperial War Museum)



Above: Improvisation wins the day: this 'Richard' is seen at a forward airstrip in Norway where the enterprising ground staff have overcome the slush and mud of a Norwegian April and laid down a plank runway from which to operate. The RAF used frozen lakes as temporary airfields but one or two bombs easily destroyed them for good. This method was more lasting and it was also repairable. (Anton Dieter via James V. Crow)

Below: A rear three-quarter view of a training unit Junkers Ju 87 busy teaching new dive-bomber aircrew. Dive-bombing came naturally to some pilots but was by no means suitable employment for all and much 'weeding-out' was required to whittle down the numerous volunteers into those with the necessary physical and mental abilities for this stressful form of aviation. This would be done at the elementary flying training period before those that passed moved on to specialist *Stuka* training taught by veterans at such places as the long-established *Stukaschule 1* at Graz in Austria. (Harold Thiele)





Above: The *Staffel* of the I. Gruppe/St.G. 77 leads the massed ranks of the unit's *Geschwaderstab* in formation during practice exercises in the spring of 1940, prior to the launching of the *Blitzkrieg* in the west. (Kelle via Sellhorn Archiv)

Opposite page, top: The cartoon character 'Felix the Cat', wielding the famous Neville Chamberlain umbrella, the symbol of British defeatism at Munich, was the emblem of the 8. *Staffel* of the III./St.G. 51, which was later to become the 5. *Staffel* of II./St.G. 1 on 9 July 1940 during a general re-organisation at the end of the campaign in France. The 'Blackman' is closing the cover of the oil-filler point, the small aperture beside his outstretched arm is the heating point, while the slanting aperture under his other elbow is the flare-pistol discharge port. (Jean-Yves Lorant via James V. Crow)

Opposite page, bottom: Concentrated precision: *Stuka* bombs bursting precisely on a crucial cross-roads in northern France in May 1940. The blocking of such routes and the denial of easy land communications proved an insurmountable handicap to the defending Allied armies who were never able to respond in time to the continued forward movement of the German columns. Nor were the British and French tactical air forces at all capable of causing similar discomfiture to the German tank and mechanised infantry columns, lacking both the accuracy of the *Stukas*, and their tight intermeshing and understanding of the ground forces' fast-changing requirements, which the Germans had now honed to perfection. (Scheffel via Sellhorn Archiv)





Above: A French artillery unit, caught out in the open crossing flat, treeless countryside without any chance of natural cover or any effective Allied air protection, is given the full *Stuka* treatment by St.G. 77 in June 1940. A direct hit on one gun mounting has left burnt and charred remains, both human and material, scattered about and by the time the pursuing German forces had reached the scene of the action only the smoke-enshrouded litter of defeat remains. (Sellhorn Archiv)

Below: June 1940. A trio of Ju 87B-1s (coded 6G+AD; 6G+CD and 6G+BD) of the *Stab III./St.G. 51* parked alongside a road doubling as an improvised runway in France. The aircraft are



bombed-up but are undergoing electrical maintenance between sorties. The rear gunner is seated and talking to the officer on the wing-walk of the nearest aircraft; the rear two aircraft are unmanned. There is no attempt at concealment from any Allied riposte, the speed of the *Stuka* and *Panzer* thrusts over-running Allied fighter bases before they had time to develop any coherent strategy. Only the twenty-two miles of the English Channel prevented British airfields going the same way. 'I must admit you have an outstanding anti-tank ditch', commented one defeated French politician wryly on being told the RAF was withdrawing its remaining fighter aircraft back to England. (Alain Fleuret via James V. Crow)

Right: The bomb in place on the swing-crutch of a Ju 87B-1 of the I./St.G. 77. Note the adjusting fitting on the crutch arm, and how the suspension block is affixed to the underside of the *Stuka*. The bracing on the weapon's tail-fins can clearly be seen with, behind them, the trailing aerial mast. In a vertical dive the crutch swung the bomb down and out to clear the large arc of the propeller. (Wilhelm Landau via James V. Crow)



Below: 'Blackmen' busy preparing a long-range Junkers Ju 87R-2 of 3./St.G. 2 for another sortie in France, June 1940. The last traces of the makeshift camouflage of brushwood are being removed from the rear empennage and the free

movement of the dive brakes and other routine checks are being carried out prior to take-off. Note the first-aid kit marking to the left of the *Balkenkreuz* and the serial number 5473 on the rudder. (Schliephake Archiv)





Above: A brief respite. Exhausting as it was for the Allies to be on the receiving end of the *Stuka/Panzer* combination, it was almost as tiring for the *Stuka* men themselves, constantly shifting their bases forward to support their *Wehrmacht* comrades, continually on call to smash any hint of resistance to the onrush, and sometimes mounting four sorties in a single day. Even the elite units had to have a pause sometimes, and refreshment, in this case apparently a bottle of wine 'liberated' from a French cellar, was always welcomed. (*Sellhorn Archiv*)

Opposite page, top: In May 1940, the forward elements of I.St.G. 77 were based at Rocroi airfield. Under the shelter of the perimeter trees a hooded Junkers Ju 87B awaits the next combat mission, with *Bordfunker* Sellhorn and 1. *Wart Unserer Maschine Unteroffizier* (First Class Aircraft Mechanic) Seitz posing before it in the early morning sunshine. (*Sellhorn Archiv*)

Right: June 1940, and at Vendeville/Lille airfield, a thirsty 'Bertha-2' of St.G. 77 has her outer starboard wing-tank replenished from a mobile tanker while a mechanic cleans her cockpit ready for another sortie harrying the fast-retreating British and French armies in what had become a general rout. It was during this period, on 13 June, that a *Staffel* of this unit was jumped by more than thirty French Morane-Saulnier MS 406s (single-seater monoplane fighters), and totally confounded them by turning towards them and engaging the French fighter aircraft with their wing guns, shooting down two of the enemy for no *Stuka* losses. (*Wilhelm Mueller via James V. Crow*)





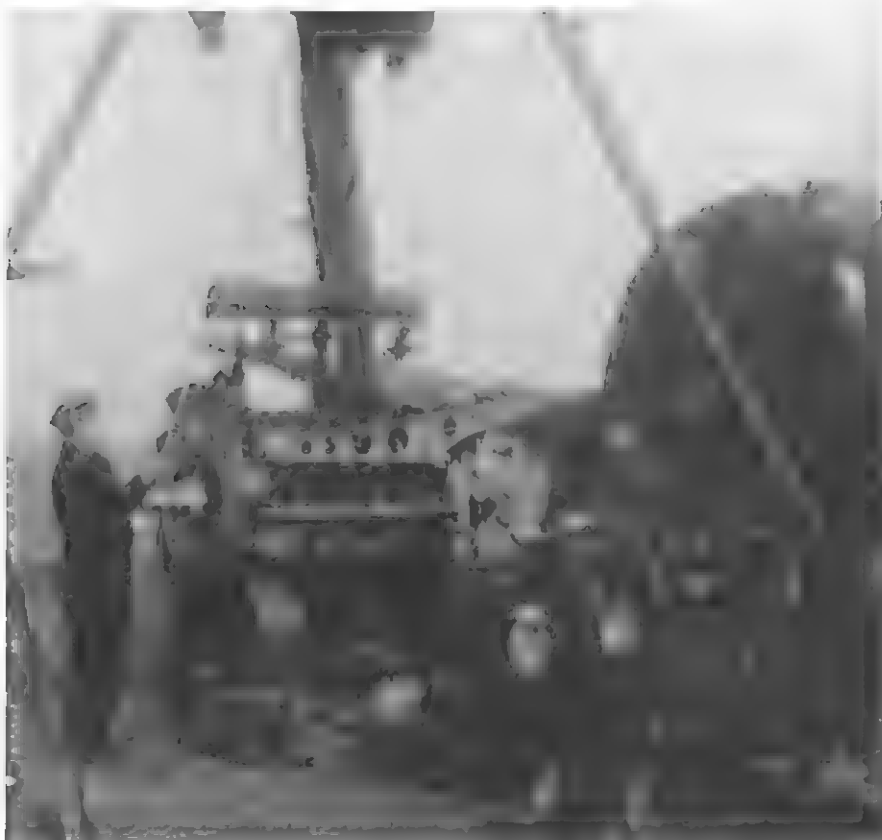
Above: 'Fliegen und Siegen'. A Junkers Ju 87R-1 in a temporary bivouac on the edge of a forest in France during the fast-moving campaign of June 1940. The word 'Blitzkrieg' ('Lightning War'), was actually an invention of the American Press once the German offensive got under way. This was in reaction to the likewise American-named 'Phoney War', the six-month lull between the fall of Poland and the opening of the attack on France. During that long period the fully forewarned Allies remained completely complaisant and overconfident. (Pegg via James V. Crow)

Below: Men of the 1. Staffel, St.G. 77 relax between sorties on the French airfield of Auxerre on the river Yonne south-east of Paris on 18 June 1940. They are supporting the drive of the 2nd and 9th Armies' thrusts south deep into the heart of France toward Dijon, Lyons, Vichy and Clermont. In the photo are, from the left: *Bordfunker Unteroffizier* Sellhorn; *Flugzeugführer Unteroffizier* Schuh; *Bordfunker Unteroffizier* Bastian; *Bordfunker Unteroffizier* Mueller; *Bordfunker Unteroffizier* Steckel; *Bordfunker Unteroffizier* Baersch; *Bordfunker Unteroffizier* Gramlich; *Bordfunker Unteroffizier* Moebius; *Flugzeugführer Unteroffizier* Palisek; *Bordfunker Feldwebel* Hettinger and *Flugzeugführer Feldwebel* Schmidt. (Sellhorn Archiv)



Above: The *Gruppenkommandeur* of 1./St.G. 77, *Leutnant* Helmut Bruck, boarding his *Stab* unit *Stuka* with its wolf's head on a yellow field emblem, about to commence his 100th combat mission. He wears his parachute over his standard yellow *Luftwaffe* kapok lifejacket for the battles over the English Channel. An outstanding dive-bomber pilot and strategist, Bruck took command of this *Gruppe* on 20 August 1940 and became its official *Kommandeur* early the next year. He was promoted to *Hauptmann* in April 1941. He was ultimately to become the *Kommodore* of the whole of St.G. 77 and, as an *Oberst*, he flew 958 combat missions in the Ju 87, finishing the war as *General der Schlachtflieger-Nord* in 1945.

(Wilhelm Landau via James V. Crow)



Opposite page, top: 'Lower-away': out with the old engine, while the replacement, carrying the number 36520, awaits fitting in its place. On the mobile 'sheer-legs' the whole 1200-hp Jumo 211 Da engine could be hoisted in or out of place quite simply. In this photograph one of the heavy-duty magnesium-alloy forged engine mounts can be seen in place. The two round bosses on the forgings are the anti-vibration engine-mounting attachments, while at the top right of the forging can be seen one of the four ball-joints that fit into recesses in the firewall and take the weight of the engine. (Wilhelm Landau via James V. Crow)

Opposite page, bottom: Close-up view of the underside of a *Stuka* of 3./St.G. 2 undergoing maintenance on a French airfield but with her main bomb already in place on the swing-crutch. With the access panel off, the tubular steel mount support strut is exposed with the starter-crank-coupling (the



crank turned the starter flywheel) dangling below and the supercharger air intake above. (via Ken Merrick)

Above: A Junkers Ju 87R-2 of 3./St.G. 2 crosses the northern French coast after completion of an attack on the final Allied strongholds, June 1940. The last stand of the British at Calais was crushed by fierce *Stuka* bombing of the citadel, and the other vital ports, like Boulogne, were taken 'on the run' by the *Wehrmacht* tank columns, leaving the remains of the BEF and the northern French armies herded into a small perimeter of open beach and sand dune around the last remaining escape harbour of Dunkirk. Only an order from on high halted the *Panzers* in their tracks, and the dedicated work of the Royal Navy, with the help of civilian sailors, taking advantage of this fateful breathing space, saved the cream of the British army from total capitulation. (Bundesarchiv)



Opposite page, top: A Ju 87B of the St.G. 77 (extreme left), sharing a temporary forward airfield with a hooded Me 110C 'Destroyer' twin-engine fighter (extreme right). Both aircraft are tethered and are undergoing maintenance or repairs at the hands of one of the mobile field units (*Einsatzhäfen*) which followed their rapid movement across north-west Europe and kept the serviceability of all units very high despite the many changes of base and intensive day-to-day operations - mobility being the key area where the *Luftwaffe* most outshone all its rivals. (Wilhelm Landau via James V. Crow)

Opposite page, bottom: An armorer of the St.G. 2 loading the main bomb held by the hydraulic lifting arm of the normal three-wheeled trolley to the *Stuka's* swing-crutch. The open fork ends of the crutch's adjustable arms fit over the bolts on the bomb's band and the suspension block, on top of the bomb, locks into the recess in the *Stuka's* belly. Note the downward-pointing trailing aerial abaft the bomb, and the wire bracing on the missile's fins. (Bundesarchiv via author's collection)



Above: The campaign in France, summer 1940: a *Stuka* unit on the move to keep up with a fast-changing situation. The St.G. 77's ground crew and other staff on the road in a *Luftwaffe* vehicle convoy move up to join their aircraft, which have jumped forward to a freshly captured French airfield as the advance proceeds rapidly. There seems little worry about any chance of Allied interdiction or riposte disturbing their meal. (Sellhorn Archiv)



Above: A pair of Ju 87B-1s make a striking picture with the sunlight catching their undersides as they head out on another sortie with full bomb load. Both machines have their undercarriage sirens blocked off. Note that the foreground aircraft's code letter 'H' is repeated in outlined white on the outer tip of each wing. (Archiv E. J. Creek)

Opposite page, top: A Junkers Ju 87 has a complete engine change in the field. The built-in capacity to have major components on hand in mobile workshops, which followed the rapidly advancing dive-bomber units, was another major factor in the *Stuka's* remarkable success. Major jobs, like this engine exchange, could be done within hours instead of flying front-line aircraft back to home airfields to have the same job done, thus cutting down on time and effort. This aircraft's firewall is shown here fully exposed with the various hydraulic pipe feeds and electrical connecting cables dangling down. At the base can be seen the massive support

box with the two bosses where the two adjustable arms of the under-fuselage swing-crutch were housed at either side. (Wilhelm Landau via James V. Crow)

Opposite page, bottom: Not every landing was a happy one. This spectacular smash of a Ju 87B on the edge of a wooded area may have been due to an accident, bad flying or as a result of action damage, but the end result was the same: a total write-off. Demolished as the *Stuka* is, this photograph gives a good view of the various access panels and light ports of the underside of the *Stuka's* wing. Considering the conditions under which the dive-bombers operated, and the claims of how vulnerable they were, such casualties were incredibly light during the first three years of the war, and, put against their achievements, made the *Stuka* a very economically attractive and cost-efficient weapon. (Archiv Von Lutz)





Above: A view of Esternay railway station, the objective of an attack by St.G. 77 in June 1940. The railway lines themselves have been accurately cut by well-placed *Stuka* bombs and the administration buildings are still burning. Part of the vital rail hub to the west of Paris, Esternay's elimination handicapped the already reeling French armies and prevented rapid transportation of troops up and down the crumbling and fluid front line. (*Karl Schubert*)

Left: Practically the only sight the *Stuka* men had of the Allied air forces was abandoned and wrecked aircraft on the airfields that they overran during the speedy advance to the coast. Here *Unteroffizier* Sellhorn looks into the cockpit of a French Bloch 151, found relatively intact at Theiville airfield, near Cherbourg, in July 1940. (*Sellhorn Archiv*)

Opposite page: A Ju 87B-1 of St.G. 77 undergoes propeller maintenance in a French orchard in the summer of 1940. The 'Blackman' on the ladder is tightening the Jumo-Hamilton metal three-bladed propeller with a ring-spanner. The vertical air-flow control shutters of the Glycol cooler radiator are shut; note the rounded upper-lip configuration of the radiator bath on this model. The exhaust outlets are of the oval open plan. The *Stuka* design incorporated easy-maintenance and enabled field operations to be maintained even under harsh conditions. (*Wilhelm Landau via James V. Crow*)





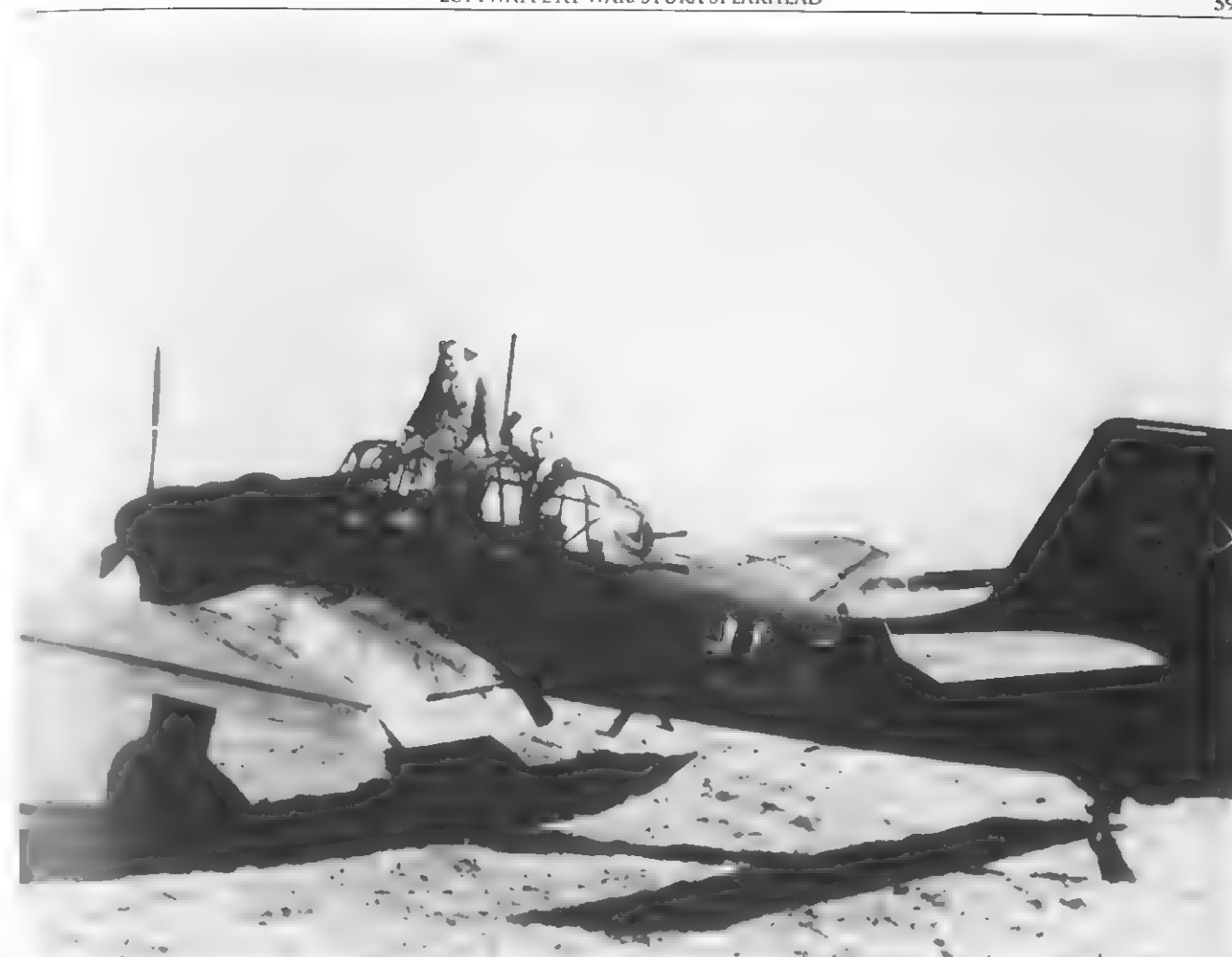
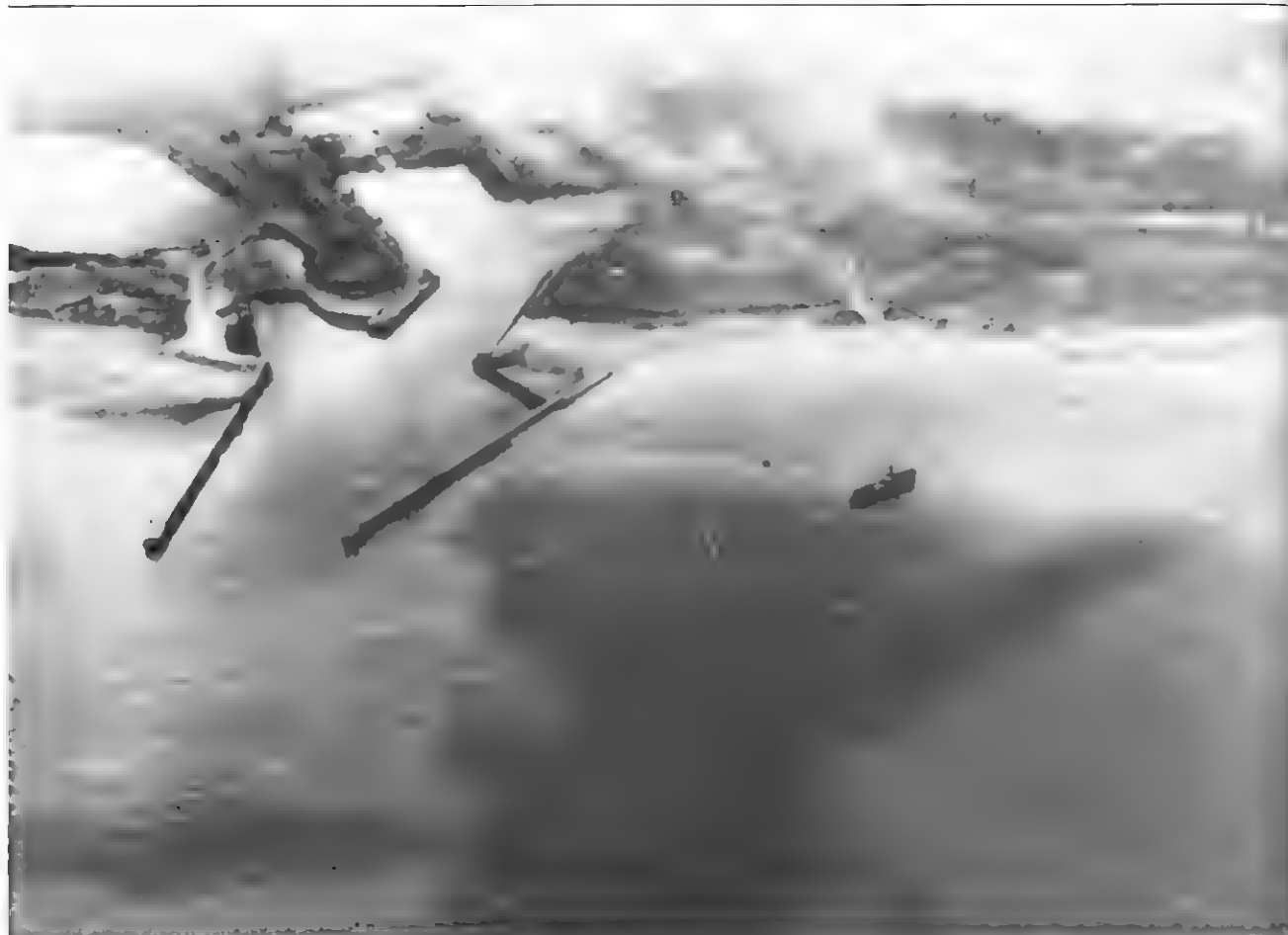
Above: Ticklish field-work is being carried out on this Ju 87B-2 of the 7. *Staffel* III./St.G. 51 (coded 6G+DR) in a French meadow between missions in the early summer of 1940. It carries its individual aircraft letter 'D' in white in quite large lettering on the side of its wheel spat. The underwing bomb racks are empty while shirt-sleeved ground crew work hard to prepare the cockpit for the next mission. The unit badge is a red eagle on a white shield (the 'Tyrol Eagle'). This unit was soon to be re-named for the third time, becoming II./St.G. 1 on 9 July 1940. (Alain Fleuret via James V. Crow)

Opposite page, bottom: A *Rotte* of Junkers Ju 87B-1s from the St.G. 2 'Immelmann' high above a thick cloud formation. Dense cloud made for impossible dive-bombing conditions, and it was the repeated bad weather over Dunkirk that did more to inhibit the *Stukas* than the RAF fighter patrols. Grounded for several days on end, the *Stukas* could play little part in events as tens of thousands of Allied troops were snatched to safety. Once the skies above the beaches cleared it was a different story, and on just one day, 1 June 1940, the destroyers *Keith*, *Basilisk*, *Havant*, *Ivanhoe* and *Foudroyant* (French), the minesweeper *Skipjack*, the troop-filled transport ships *Scotia*, *Prague* and *Brighton Queen*

were all sunk with heavy loss of life. St.G. 2 contributed to this total and was busy at Dunkirk between 27 May and 1 June. Note how these two aircraft are only carrying a single heavy bomb. (Franz Selinger)

Opposite page, top: Dunkirk, June 1940. While the fuel tanks blaze ashore, two British destroyers manoeuvre off the Mole. Although it was claimed that the RAF defended the evacuation throughout the whole period, this defence was patchy at best. *Stuka* attacks were mainly hindered by bad weather conditions over the evacuation beaches, and when they did get through caused severe losses among the evacuating ships. Included in a long list of casualties which fell prey to the dive-bombers were the destroyers *Gallant* (damaged), *Jaguar* (damaged), *Grenade* (sunk), *Intrepid* (damaged), *Saladin* (damaged), *Sabre* (damaged), *Sirocco* (French) (sunk), *Greyhound* (damaged), *Harvester* (damaged), *Basilisk* (sunk), *Keith* (sunk), *Ivanhoe* (damaged), *Vivacious* (damaged), *Havant* (sunk), *Foudroyant* (French) (sunk), *Worcester* (damaged), as well as a whole host of lesser warships and merchant vessels. (Imperial War Museum)





Opposite page, top: The end of the road: the two Moles of the entrance to Dunkirk harbour viewed from the cockpit of a *Stuka* in May, 1940. Their bombs can be seen exploding in the right-hand arm of the outer harbour where ships have been hit and set on fire, while beyond the line of poplars more fires are burning in the town itself as a result of earlier attacks on troop concentrations. A large oil slick from a sunken vessel out of camera range is spreading towards the coast on the incoming tide and another British merchant vessel can be seen hit, beached and abandoned in its centre. (Scheffel via Sellhorn Archiv)

Opposite page, bottom: Among the many unsung successes of the *Stuka* during the brief 'Channel Offensive' that preceded the Battle of Britain proper was the driving away from Dover Harbour of the Royal Navy's front-line anti-invasion defence, the 1st Destroyer Flotilla. Fast and elusive, but packing a powerful punch, these destroyers would have been the first line of defence had the German invasion convoys sailed. But in Ju 87 attacks throughout June, July and August the flotilla was badly hit. *Keith* and *Basilisk* had been sunk off Dunkirk on 1 June, *Bulldog* and *Boadicea* were both damaged by *Stukas* on 11 June, *Beagle* was damaged on 19 July, *Brazen* was sunk on 20 July, and both *Boreas* and *Brilliant* were badly damaged on 25 July, leav-

ing only *Codrington* (refitting) and *Bulldog* (being repaired). *Codrington* then had its back broken in an attack by Me 109 and Me 110 fighter-bombers on 27 July. The Dover Command War Diary commented that, 'The sinking of two destroyers and the damaging to a greater or less degree of five others in fifteen days, constituted a rate of loss which could not be suffered for an indefinite period.' It was decided to send the remaining destroyers, along with their depot ship, *Sandhurst*, to the relative safety of Portsmouth. The *Stukas* had thus removed one obstacle from Admiral Raeder's path very efficiently. This photograph shows *Stuka* bombs exploding by the Prince of Wales pier; the destroyer underway on the left is the *Boreas*. (Imperial War Museum)

Above: The happy crew of a Ju 87 'Bertha' on their return from another mission over the English Channel. At the peak of their attacks the German dive-bombers were sinking one ship in every three that tried to run the gauntlet. The Royal Navy requested air protection, but the RAF's response to Admiral Ramsey was to advise him 'to put it in writing and forward it the Air Ministry where it will be considered'. In the end Winston Churchill had to intervene directly and order that the convoys receive protection. (Archiv E. J. Creek)



Above: A Ju 87 'Bertha' F1+AC of III./St.G. 77 with the 'splinter' camouflage on her uppersides is pictured over France in the late summer of 1940. The unit's emblem, a black knight on horseback on a yellow field with a blue top, derived from the family crest of *Hauptmann* Helmut Bode (the unit *Kommandeur*), is proudly emblazoned forward of the pilot's cockpit. The 36-year-old Bode came to the III./St.G. 77 from I.(Stuka)/186 where he had been their *Staffelkapitän*. (Archiv Von Lutz)

Right: A Stuka attack on coastal convoy CW 7 in the Straits of Dover on 20 July 1940. Bombs burst astern of the escorting destroyer HMS *Brazen*, which is going full speed (black smoke from both her funnels) and firing back (white smoke from her forward two 4.7-inch guns). Meanwhile the little coasters and tankers plod on. (Imperial War Museum)

Opposite page, top: Rehearsal for Operation SEALION. Low-level flying over the French beaches off Riva-Bella, Caen, July 1940. The Stuka unit is I. *Staffel* St.G. 77. Such exercises gave the Stuka crews experience in strafing coastal areas in conditions similar to those in which they were expected to operate on the other side of the Channel when the invasion of England was eventually launched. The Stuka dive-bombers would have played a vital role in this, both blasting a path for the invasion force to get ashore, destroying coastal defences, strong-points and shore artillery, and in defeating any attempt, during daylight hours, by the Royal Navy to intervene against the invasion ships and support convoys. Once established ashore they would have reverted to the tried-and-tested army support role and there would have been little to stop them. (Sellhorn Archiv)





Opposite page, top: Britannia rules the waves! But Germany ruled the skies over the French Channel coast in July 1940, and thus this ammunition ship was able to bring the *Stuka* formations fresh bombs and other ordnance direct from the factories in Germany, with relative immunity from aerial attack, in readiness for their next campaign. Here smiling French POWs are employed under nominal and relaxed guard to unload the German vessel at Cherbourg docks. (*Sellhorn Archiv*)

Opposite page, bottom: For a time during the Battle of Britain, the *Stab* of St.G. 77 was allocated one of the big twin-engined long-range Me 110 fighter aircraft for its own use. One such is photographed here at Theiville, being refuelled. These long-range 'Destroyer' fighters were mis-used

during the subsequent battle, much as were the short-range *Stukas*. The Me 110 was later to be much better deployed in the Mediterranean, as was the *Stuka*, and was also utilised in both ground-attack and night-fighting roles. (*Sellhorn Archiv*)

Above: For the campaign against England, I./St.G. 77 was based at Maltot airfield, near Caen in Normandy. Here the well-established pilot/radio man team of *Feldwebel* Knauer and *Bordfunker* Sellhorn are pictured with their regular mount. Note that even at this early date both the undercarriage sirens have been faired off; also note the *Stab* band around the propeller boss of their machine. (*Sellhorn Archiv*)



Left: July 1940: on the way to England, a *Stukagruppe* is seen here in the process of forming up over its French airfield of Theville on 9 July 1940 before heading for the target, probably Portland naval base. The *Stukas* are moving into their standard cruising formation, with *Ketten* of three aircraft concentrating to give mutual supporting cover, and one *Kette* catching up with the formation. Fighter protection usually formed up above and astern later on before crossing the coast and this cover was usually controlled by the *Kommandeur* of the dive-bomber unit. This arrangement worked quite well, despite the complaints of the fighter pilots, who, naturally, would rather have been given a free hand. On the one occasion when this arrangement was changed, and the fighter *Kommandeur* given control of both formations, disaster resulted as the St.G. 77 was left bereft of any protection at all when attacked by two squadrons of British fighters. (James V. Crow)

Below: A Junkers Ju 87B-1, coded 6G+HR of the 4./St.G. 1, based near Cherbourg in August 1940, and still carrying the unit emblem of III./St.G. 51 after its re-designation on 9 July 1940. On 4 July 1940 this unit, commanded by *Hauptmann* Anton Keil, had made a 33-plane dive-bombing attack on the British naval base of Portland. They achieved total surprise and hit the auxiliary AA ship HMS *Foylebank* with no less than twenty-two direct hits in less than eight minutes. It sank with 176 of its crew. The *Foylebank* was a nine-year-old 5582-ton converted merchant vessel, and only just fitted out

with eight 4-inch Mk XVI guns in four twin mountings and eight 2pdr pom-poms, also in twin mountings, especially designed to deal with air attack on convoys, but it could not handle the *Stuka*. The dive-bombers also sank the tug *Silverdial* and damaged eight other large merchant ships. Only one solitary dive-bomber, that of *Leutnant* Helmut Schwarz, was hit in reply and had its wing blown off, crashing and exploding on impact, killing both aircrew. (via Ken Merrick)



Above: A Junkers 87-B of I./St.G. 3 based at Caen, France, in the summer of 1940. This unit had formerly been the I./St.G. 76, and, before that, the St.G. 168, the *Graz Gruppe* from its original home airfield of Graz, Austria. Clearly seen in this photograph are the three rectangular hand-holds/footrests along the fuselage under the cockpit 'greenhouse' and the composite non-skid walk pad along the wing-root and the MG-15 machine-gun in its rotating mount. (Richard Chapman)

Below: Awaiting the take-off signal at their forward base of Maltot, France, the 'Bertha-2s' of the 7. *Staffel* III./St.G. 77, re-designated from the I./KG. 76 on 9 July, sit ready, bombed-up and awaiting the signal flare for take-off. Under the command of *Hauptmann* Helmut Bode the thirty-one *Stukas* made a classic dive-bombing attack on Poling CH (Chain Home) radar station on 18 August, scoring forty-four direct hits and forty-three near misses, which demolished two of the radar pylons and put the vital link in the British radar screen out of action for a week, all for the loss of just two *Stukas*. (Rohrbach via James V. Crow)





Above: Caen, France, and the ground staff of the I./St.G. 77 gather round an upturned *Stuka* which was badly damaged over the English coast and overturned while making an emergency landing, trapping both the injured aircrew inside. While a doctor attends to the rear gunner, mechanics examine the wrecked engine and radiator cowlings. (Wilhelm Landau via James V. Crow)

Right: Some of the Junkers Ju 87s that made it back to France after being jumped by British eight-gun fighters only just got home. Here a 'Bertha' is seen on a French beach at low tide where a salvage operation is underway. A large flotation bag has been positioned under the rear fuselage, and another, as well as an inflatable life-raft, performs similar functions under the near-side wing. Note the rear cockpit has been blown away, and the undercarriage, propeller and spinner, are also missing; also the two open hatches with fuel being siphoned off from both wing tanks for safety and wreck flag atop the wireless mast. (Richard Chapman)

Opposite page, top: A *Stuka* of the I./St.G. 77 having its engine checked at Caen/Maltot airfield, France, in August 1940. Note the unit's 'Diving Jolanthe' emblem. The engine is running and the propeller is a blur, while the 'Blackmen' listen to the engine's tone. The heavy support for the radiator can be seen, as can the vertical shutters and supercharger air intake. (Wilhelm Landau via James V. Crow)





Line-up of 'Bertha-2s' of the *Stab Staffel* of the I./St.G. 3. The unit's emblem, the arms of the city of Graz, Austria, mark its origins, the unit having just been re-designated from I./St.G. 76, the *Graz Gruppe*. Their *Kommandeur* remained *Hauptmann* Walter Sigel. In one devastating dive-bombing attack on Lee-on-Solent airfield on 16 August three hangars were destroyed, along with many naval aircraft, all without a single *Stuka* loss. (Rohrbach via James V. Crow)



Opposite page, top: The spoils of war: autumn 1940 and a French Potez 63 light bomber with German markings is undergoing testing and evaluation trials at Le Bourget airfield which, at that time, was being utilised by the I./St.G 77 as a rear-area field for its own training and replenishment base. (Sellhorn Archiv)

Above: The Ju 87R reached *Stuka* units in France in September 1940, when this photograph was taken. The dive-bombers had been withdrawn from the on-going air assault on Britain as the action moved further away from their French airfields, and they had re-grouped and concentrated in the Pas de Calais area. Here they replenished losses and intensified their training in readiness to resume their role of supporting the *Wehrmacht* in the invasion, defending the beach-head against intervention from the Royal Navy, and then leading the subsequent planned drive towards Reading. The allocation of long-range 'Richards' would have given the *Stukas* added mobility in all of these scenarios, had they come to fruition. (via Ken Merrick)

Left: Firmly anchored to the ground by metal stakes driven into the runway grass and fastened to the rear wheel housing and the undersides of both wings, these two Junkers Ju 87B-2s of II./St.G. 1 are seen at Saint-Pol, wrapped up from the northern French elements in the late autumn of 1940 with fitted tarpaulin covers. While awaiting the outcome of the second stage of the Battle of Britain, the *Stuka* units were concentrated and poised ready to lead the actual seaborne assault, Operation SEALION. (via Ken Merrick)



Top: A view of this Junkers Ju 87-1 of the *Fliegerführerschule C 12* (Advanced Training School No. 12) and still toting the emblem of her former unit, III./St.G. 2 'Immelmann', in nose-over position at the Ruzyn airfield near Prague. The incident took place on 13 March 1941 and the *Stuka* suffered scant damage. It carries the yellow letter 'A' in addition to the four-letter code NO+HP, but is otherwise little changed from its combat days. No doubt the novice pilot who placed it in this position went on to better things quoting the *Luftwaffe* equivalent of 'Any landing you walk away from, is a good landing.' (Harold Thiele)

Above: During the second winter of the war, and while awaiting fresh orders after the postponement of Operation SEALION until the spring, St.G. 77 sees out the bleak months at Le Bourget airfield, France. Here is a line-up on the snow-covered airfield with engines running. In the event their next moves were not across the Channel to Kent, but in the opposite direction. Hitler had long wanted to settle accounts with Stalin and already plans were being made for a rapid and secret shift of forces to achieve this. (Wilhelm Landau via James V. Crow)

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